

RELATED APPLICATIONS

A1
pre
The present patent application is a Divisional of prior application serial no. 09/438,346, filed November 11, 1999, entitled Magnetic Head Device, And Method Of Its Manufacture ~~now abandoned~~

In The Claims:

Please cancel claims 1-4 without prejudice and add the following new claims 5-36 to the application.

- A2
5. (New) A method of manufacturing a magnetic head device, comprising:
forming a thin film magnetic head element that includes a magnetoresistance (MR) element;
polishing a side surface of the thin film magnetic head element; and
removing a magnetically degenerated layer from the side surface.
6. (New) The method of claim 5 wherein removing the magnetically degenerated layer comprises etching the side surface.
7. (New) The method of claim 5 wherein removing the magnetically degenerated layer comprises milling the side surface.
8. (New) The method of claim 5 wherein forming the thin film magnetic head element comprises:
forming a first shield layer over a substrate surface of a slider;
forming a first half gap layer over the first shield layer;
forming the MR element over the first half gap layer;
forming a second half gap layer over the MR element; and

forming a second shield layer over the second half gap layer.

9. (New) The method of claim 8 wherein the MR element is formed with a stripe height equal to a target stripe height plus a depth of the magnetically degenerated layer.

A2 10. (New) The method of claim 9 wherein removing the magnetically degenerated layer comprises etching the magnetically degenerated layer until the stripe height of the MR element is equal to the target stripe height.

11. (New) The method of claim 5 further comprising:
coating the side surface with a diamond-like carbon material.

12. (New) The method of claim 8 further comprising:
forming an inductive head element over the substrate surface of the slider, the inductive head element including upper and lower magnetic pole layers separated by a gap layer.

13. (New) The method of claim 12 wherein the lower magnetic pole layer is common with the second shield layer.

14. (New) The method of claim 12 further comprising machining the slider to form air-bearing surface rail parts.

15. (New) A method of manufacturing a magnetic head device, comprising:
forming a thin film magnetic head element over a substrate, the thin film magnetic head element including a magnetoresistance (MR) element;

cutting the substrate, the MR element being exposed on a side surface of the substrate;

polishing the side surface; and

removing a magnetically degenerated layer from the side surface.

16. (New) The method of claim 15 wherein removing the magnetically degenerated layer comprises etching the side surface.

A2

17. (New) The method of claim 15 wherein removing the magnetically degenerated layer comprises milling the side surface.

18. (New) The method of claim 15 wherein forming the thin film magnetic head element comprises:

forming a first shield layer over the substrate;

forming a first half gap layer over the first shield layer;

forming the MR element over the first half gap layer;

forming a second half gap layer over the MR element; and

forming a second shield layer over the second half gap layer.

19. (New) The method of claim 18 wherein the MR element is formed with a stripe height equal to a target stripe height plus a depth of the magnetically degenerated layer.

20. (New) The method of claim 19 wherein removing the magnetically degenerated layer comprises etching the magnetically degenerated layer until the stripe height of the MR element is equal to the target stripe height.

21. (New) The method of claim 15 further comprising:
coating the side surface with a diamond-like carbon material after removing the magnetically degenerated layer.

22. (New) The method of claim 18 further comprising:
forming an inductive head element over the substrate, the inductive head element including upper and lower magnetic pole layers separated by a gap layer.

23. (New) The method of claim 22 wherein the lower magnetic pole layer is common with the second shield layer.

24. (New) The magnetic head device of claim 15 further comprising machining the substrate to form air-bearing surface rail parts.

25. (New) The method of claim 22 wherein the gap layer comprises a material consisting essentially of silicon oxide, tantalum pentoxide, or a beryllium-copper alloy.

26. (New) The method of claim 15 wherein the magnetically degenerated layer is approximately 1000 angstroms thick.

27. (New) The method of claim 22 wherein the gap layer and the first and second half gap layers comprise a non-alumina-based nonmagnetic material.

28. (New) The method of claim 27 wherein the first shield layer and the upper and lower magnetic pole layers comprise a magnetic material having an etch rate

that is substantially the same as an etch rate of the non-alumina-based nonmagnetic material.

29. (New) The method of claim 15 further comprising forming a nonmagnetic undercoat layer on the substrate.

A2
00403660
30. (New) A method of manufacturing a magnetic head device, comprising:
polishing air-bearing surface (ABS) of a slider that includes a thin film magnetic head element formed on a side surface, the thin film magnetic head element including a magnetoresistance (MR) element that is exposed along the ABS, wherein polishing of the ABS produces a magnetically degenerated layer on the ABS; and
removing the magnetically degenerated layer.

31. (New) The method of claim 30 wherein the MR element is disposed between first and second shield layers, the MR element being separated from the first and second shield layers by first and second half gap layers, respectively.

32. (New) The method of claim 30 wherein removing the magnetically degenerated layer comprises etching the ABS.

33. (New) The method of claim 30 wherein removing the magnetically degenerated layer comprises milling the ABS.

34. (New) The method of claim 30 wherein the MR element is formed with a stripe height equal to a target stripe height plus a depth of the magnetically degenerated layer.

A2

coating the ABS with a diamond-like carbon material after removing the magnetically degenerated layer.

[illegible]